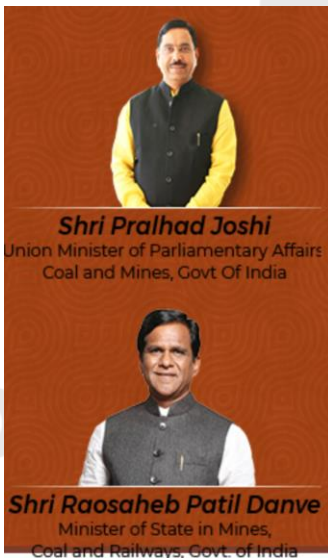


# Mineral in India



*Iron*



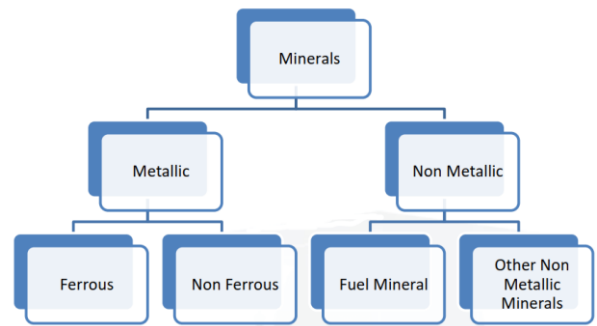
*Copper*



*Gold*

Pratham Classes

- A mineral is a naturally occurring substance, representable by a chemical formula, that is usually solid and inorganic, and has a crystal structure.
- A mineral is a pure inorganic substance that occurs naturally in the earth's crust. More than two-thousand minerals have been identified and most of these are inorganic, which are formed by the various combination of elements. However, a small proportion of the earth's crust contains organic materials, consist of single elements such as gold, silver, diamond, and sulfur.



## Metallic Minerals

- Metallic Minerals are minerals in which metal elements are present in their raw form. When metallic minerals are melted a new product is formed.
- Metallic minerals constitute the second most important group of minerals after fossil fuels. They are reserved in Archean rocks.
- Major examples of metallic minerals are iron ore, copper, gold, Zink, Silver, Manganese, Chromites, etc. They constitute 7% of the total mineral value in India.
- **Metallic minerals are further sub-divided as ferrous and non-ferrous metallic minerals**
- The minerals containing iron are known as ferrous (Chromites, Iron ore, and manganese), and without iron are known as non-ferrous (lead, silver, gold, copper, bauxite, etc.).
- **Significance of Metallic Mineral:**
- the standard of living of the people living in a country is judged by the consumption of iron. It is the backbone of modern civilization and the foundation of basic industry.

## Non-metallic Minerals

- Non-metallic minerals do not contain any metal substances in them. Nonmetallic minerals are a special group of chemical elements from which no new product can be generated if they are melted.
- Depending upon the origination, non-metallic minerals are either organic (such as fossil fuels also known as mineral fuels, which are derived from the buried animal and plant, e.g. such as coal and petroleum), or inorganic minerals, such as mica, limestone, graphite, etc.

# Mineral Resources in India (Mineral Rich Regions)

- There are five major mineral belts in India namely:

- Northern Belt
- Central Belt
- Southern Eastern region
- South Western region
- North-Western region



- Northern Belt: The Northern Belt comprise of the following regions-
  - **Chhota Nagpur plateau:**
- Minerals found in this region is Kynite(100%), Iron (90%), Chromium(90%), Mica(75%), Coal(70%).
- Manganese, copper, and limestone are some other minerals found in this region.
- **Assam Petroleum reserve:** This region comprises the reserves of petroleum and lignite coal, tertiary coal, etc.

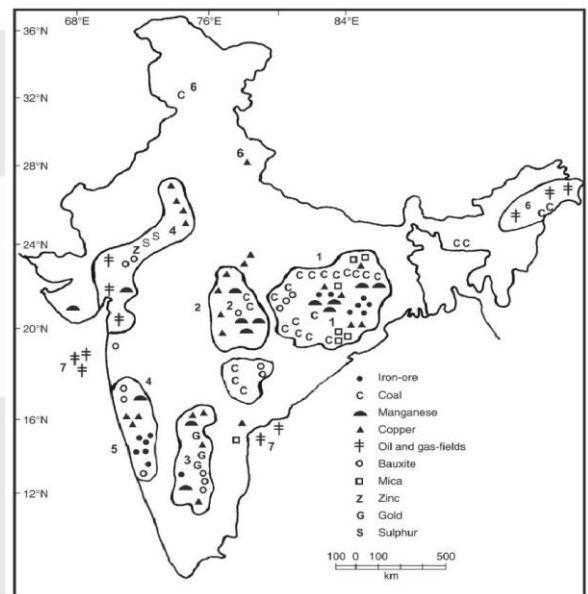


Fig. 7.1 Mineral Belts

- **Central belt:**
- This region comprises the Chhattisgarh and Maharashtra region which is the extension of the Chhota Nagpur plateau.
- There are huge reserves of Iron and limestone in Chhattisgarh.
- **Godavari-Wardha valley with huge coal reserves lies in this region.**
- **South Eastern region**
- Eastern Karnataka: In this region, Bellary is known for their iron reserves
- Andhra Pradesh: **Cuddapa and Kurnool** region are major mining centres. Nellore in Andhra Pradesh is known for Mica reserves.
- **Telangana: Telangana is known for Bauxite reserves.**
- **Tamil Nadu: Tamil Nadu has the highest lignite coal reserves in India.**

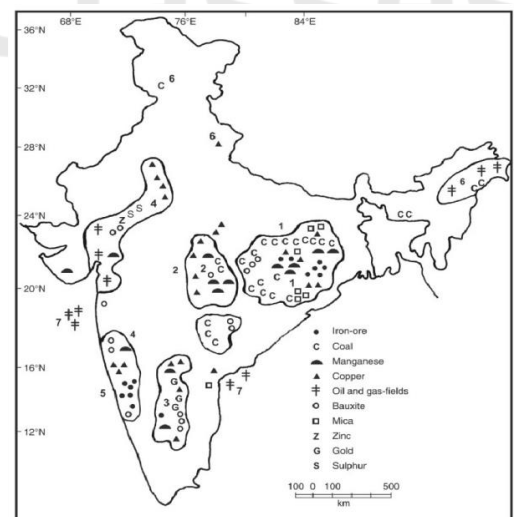


Fig. 7.1 Mineral Belts

- **South Western region**
- Karnataka: Dharwad region of Karnataka is known for its high mineral reserves.
- Shimoga, Chitradurg, Yumkur, Chikmagalur are some other areas with high mineral reserves.
- Goa is known for its rich iron reserves.
- Ratnagiri in Maharashtra also has iron reserves.
- **North Western region**
- This region consists of the areas Rajasthan and Gujarat along the Aravalli Range.
- Gujarat is known for its petroleum deposits. Gujarat and Rajasthan both have rich sources of salt.
- **Example: Salt from Kutchh and Playa Lake of Rajasthan.**
- Rajasthan is rich in building stones i.e. sandstone, granite, marble. Dolomite and limestone provide raw materials for the cement industry.

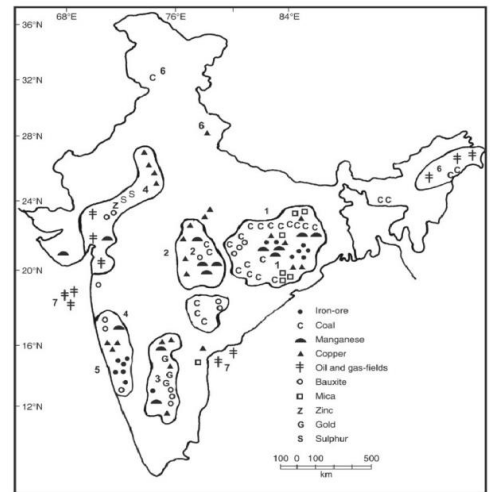
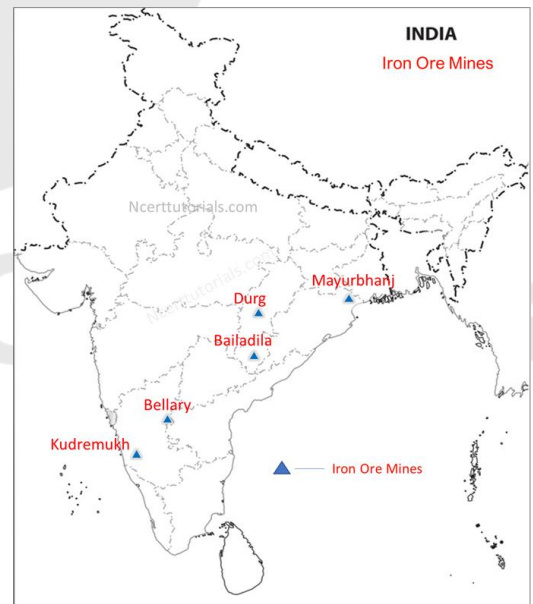


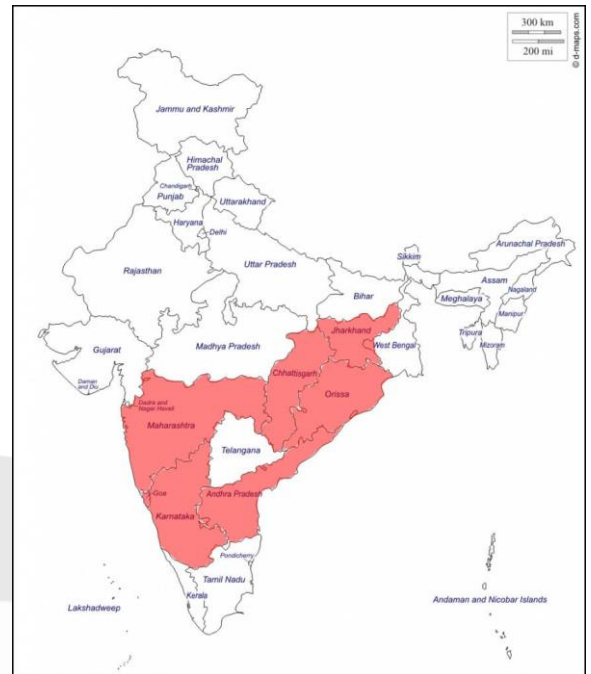
Fig. 7.1 Mineral Belts

## Iron Ore Distribution

- Iron ores are rocks and minerals from which metallic iron can be extracted.
- **Magnetite:** It is the most important and best kind of iron ore. It contains about 72 percent metallic iron in it. It is found in Karnataka, Andhra Pradesh, Rajasthan, Tamil Nadu, Goa and Kerala.
- **Hematite:** It is also an important source of Iron. It contains about 60-70 percent metallic iron in it. It is **red and brown in colour**. It is found in Odisha, Jharkhand, Chhattisgarh and Andhra Pradesh. In the western section, Karnataka, Maharashtra and Goa have this kind of ore.
- **Limonite:** It contains about 30 to 40 percent metallic iron in it. It is mostly **yellow in colour**. It is **low-grade iron ore**.
- **Siderite:** It has **more impurities**. It contains about 48 percent metallic iron content in it. It is **brown in colour**. It contains a mixture of iron and carbon. It is low-grade iron ore. It is self-fluxing due to the presence of lime.

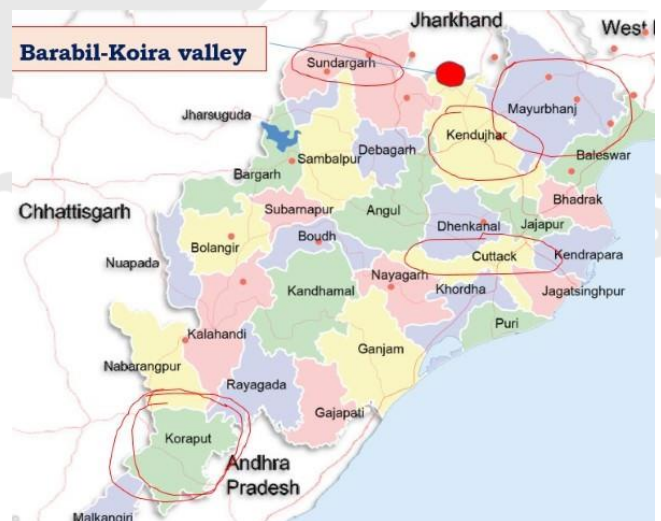


- The highest producer is the Odisha Jharkhand belt, Durg Bastar Chandrapur belt, Bellary-Chitradurga-Chikmagalur-Tumkur belt, and the Maharashtra Goa belt.



## Iron Ore in Orissa

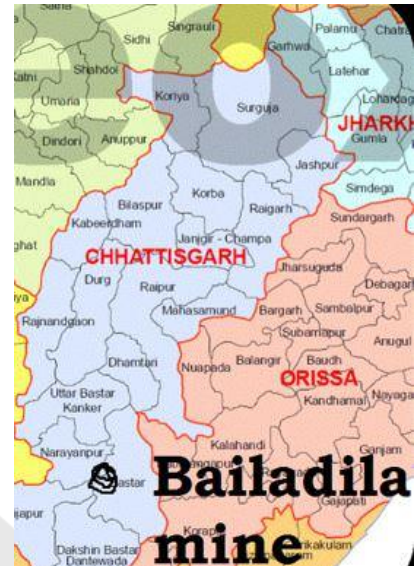
- The ores are rich in haematites.
- India's richest haematite deposits are located in Barabil-Koira valley.
- Others: Sundargarh, Mayurbhanj, Cuttack, Sambalpur, Keonjhar and Koraput districts.





## Iron Ore in Chhattisgarh

- Chhattisgarh has about 18 percent of the total iron ore reserves of India.
- The iron ores are widely distributed, the prominent deposits being those of Bastar and Durg districts.  
**Bailadila in Bastar district and Dalli Rajhara in Durg district are important producers.**
- Bailadila mine is the largest mechanized mine in Asia (Ore beneficiation only done here).
- A 270 km long slurry (a semi-liquid mixture) pipeline is being constructed to bring the ore from the **Bailadila pithead to the Vizag plant. Smelting is done in Vizag (Vishakhapatnam) Iron and Steel plant.**



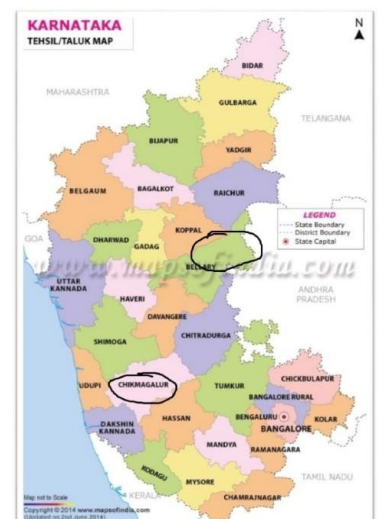
## Iron Ore in Jharkhand

- 25 per cent of reserves.
- First mine in Singhbhum district in 1904.**
- Iron ore of here is of highest quality and will last for hundreds of years.
- Noamandi mines in Singhbhum are the richest.
- Magnetite ores occur near Daltenganj in Palamu district.



## Iron Ore in Karnataka

- High grade ore deposits are those of Kemmangundi in **Bababudan hills of Chikmagalur district** and Sandur and Hospet in Bellary [Lot of Mining Mafia].
- Most of the ores are high grade haematite and magnetite.
- Donimalai Iron Ore Mine**
- Commissioned in 1977, the mine is located in Bellary region of Karnataka.



- OD(55%)>CG(17%)> Ka(14%).
- Australia (30.83%)>China (26.12%)>Brazil (15.74%)>India (7%)>Russia (3.28%).
- Japan is the biggest buyer of Indian iron ore accounting for about three-fourths of our total exports.
- Major ports handling iron ore export are Vishakhapatnam, Paradip, Marmagao, and Mangalore.

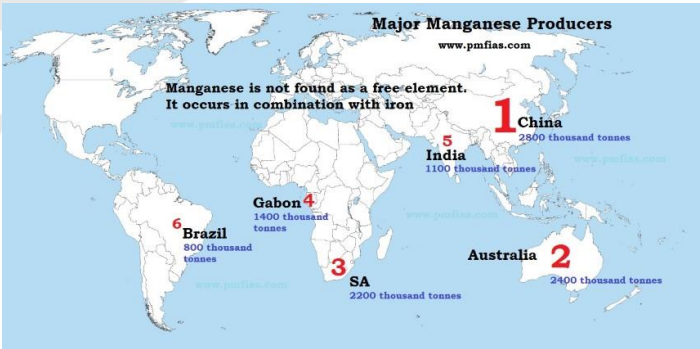
## Manganese

- Manganese is not found as a free element in nature.
- It is often found in combination with iron.
- The most important manganese ore is pyrolusite.
- Manganese is primarily used in iron and steel industry.
- 6 kilograms of manganese ore is required for manufacturing one tonne of steel.
- It is also used in the manufacturing of bleaching powder, insecticides, paints, and batteries.



## Manganese Ore Distribution in India

- India processes second largest reserves in the world after Zimbabwe; 430 million tonnes
- India is the world's fifth largest producer after China, Gabon, South Africa and Australia.
- Maharashtra, Madhya Pradesh, Odisha, Andhra Pradesh and Karnataka are the major manganese ore producing states.
- Maharashtra and Madhya Pradesh together produce more than half of India's manganese



Manganese  
•Steel, Bleaching powder, Insecticides

•Reserve:OD(44%)>KA(22%)>MP(13%)>MH,GO A(7%).  
•2<sup>nd</sup> in world reserves, after Zimbabwe.  
•MH:Nagpur,Ratnagiri, MP:Balaghat,Chindwara, AP: Vizag,Srikakulam, Cuddapah  
KA:Uttarkannada,Shimoga,Bellary,Chitradurg, Tumkuru.

•Production:MP(33%)> MH(27%)>OD(16%)

- Odisha features like the heart of Manganese production in India (Bonai, Sundargarh, Gangpur, Korput).
- Other Manganese producing states are Karnataka (Dharwad, Bellari, North Canara, Chitradurga, Tumkur, etc.), Jharkhand (Chaibasa), Madhya Pradesh (Bala Ghat), and Maharashtra (Nagpur, Ratnagiri, and Bandra).



## Copper

Copper is a good conductor of electricity and is ductile  
 Iron + Nickel + Copper + Chromite +.....== Stainless Steel.

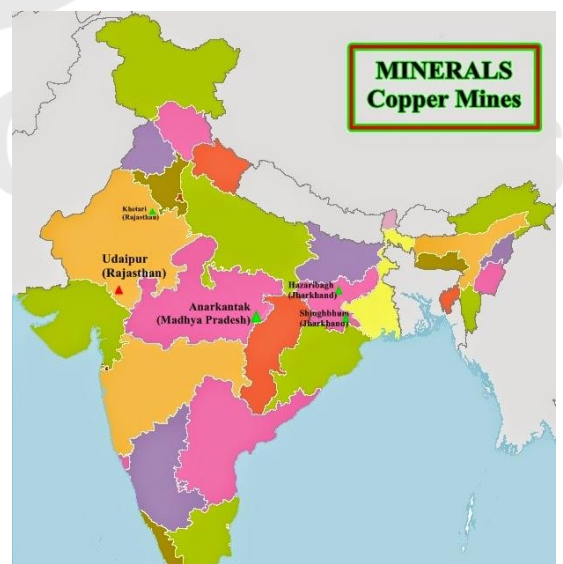
Copper + Nickel == Morel Metal.

Copper + Aluminium == Duralumin.

Copper + Zinc == Brass.

Copper + Tin == Bronze.

- **Madhya Pradesh**
  - 1st in production [59.85 %].
  - Malanjkhand copper mines of Balaghat district are the most important ones.
  - Reserves of moderate size are also found in Betul district.
- **Rajasthan**
  - 2nd in production [28%]
  - Found along the Aravali range.
  - Ajmer, Alwar, Bhilwara, Chittaurgarh, Dungarpur, Jaipur, Jhunjhunu, Pali, Sikar, Sirohi and Udaipur districts.
  - **Khetri-Singhana belt in Jhunjhunu district is the most important copper producing area.**

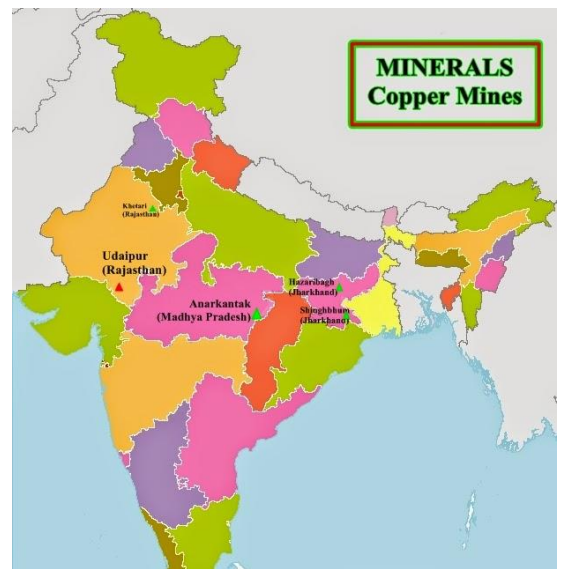




- **Jharkhand**
- 3rd in production [11 %].
- Singhbhum is the most important copper producing district.
- Found in Hazaribagh district, Santhal Parganas and Palamu districts.

#### • Copper Refineries in India

- Hindustan Copper → Khetri, Jhunjhunu district, Rajasthan
- BALCO → Korba, Chhattisgarh
- Hindalco (Birla) → Dahej, Bharuch district of Gujarat
- Sterlite Industries → Tuticorin, Tamil Nadu



#### Copper

•Used in Electric machinery, space, automobiles, defence, and telecom industries.

#### •Reserve:

- RJ(54%)>JH(20%)> MP(19%)
- Chile(23%)>Australia & Peru (10% each)>Russia (7%)>Mexico & USA (6% each)

#### •Production:

- MP(53%)>RJ(42%)>JH(4%)
- Chile produces largest(28%)>Peru(12%)

## Mica

- Mica is a naturally occurring non-metallic mineral that is based on a collection of silicates.
- Mica is a very good insulator that has a wide range of applications in electrical and electronics industry.



<b>Mica</b> •High Insulation •Used in Electrical and Electronics industry, navigation compasses, optical instruments.	•AP(41%) followed by RJ(28%)>OD(17%)>MH(13%). • <b>AP</b> : Nellore, Visakhapatnam, <b>RJ</b> : Jaipur to Udaipur to Bhilwara. •Brazil, India and Madagascar.	•India has near monopoly in Mica Production
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<ul style="list-style-type: none"> <li>• <b>Andhra Pradesh</b></li> <li>• 1st in production [93 %].</li> <li>• The mica belt lies in Nellore district [Gudur Mica mines].</li> <li>• Vishakhapatnam, West Godavari and Krishna are other important mica producing districts.</li> <li>• <b>Rajasthan</b></li> <li>• 2nd in production [6.3 %].</li> <li>• The main mica belt extends from Jaipur to Udaipur [Along Aravalis].</li> <li>• <b>Jharkhand</b></li> <li>• 3rd in production.</li> <li>• Mica is found in a belt extending for about 150 km in length and 32 km in width from Gaya district of Bihar to Hazaribagh and Koderma districts of Jharkhand. This belt contains the richest deposits of <b>high quality ruby mica</b>.</li> <li>• Koderma is a well-known place for mica production in Jharkhand.</li> </ul>
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## Chromite

<ul style="list-style-type: none"> <li>• Chromite is an oxide of iron and chromium = Combination of chromium, iron and oxygen.</li> <li>• It is the only economic ore of chromium.</li> </ul>
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<b>Chromite</b> •Manufacture of rails, automobiles, armour plates, armour piercing projectiles.	•96% of chromite reserves in INDIA is in OD. •OD: Jajpur, Kendujhar & Dhenkanal districts. •Rest in MN,NL. •3 <sup>rd</sup> in world(18%). •Kazakhstan(40%)> S.Africa (35%) .	•OD-major producer(99%). •South Africa is the largest producer followed by Kazakhstan, Turkey. •India- 4 <sup>th</sup> in global ferrochrome production.
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# Nickel

- Nickel does not occur free in nature.
- It is found in association with copper, uranium and other metals.
- Iron + Nickel == stainless steel.
- Nickel + Copper or Silver == Coins.

Denomination	Picture	Metal	Weight (gms)	Diameter (mm)	Shape
Five rupee (new)		Ferritic Stainless Steel (FSS)	6.00	23	Circular
Five rupee (old)		Cupro-Nickel	9.00	23	Circular
Two rupee (new)		Ferritic Stainless Steel (FSS)	5.62	27	Circular
Two rupee (old)		Cupro-Nickel	6.00	26	Eleven-Sided
One rupee		Ferritic Stainless Steel (FSS)	4.85	25	Circular
Fifty paise		Ferritic Stainless Steel (FSS)	3.79	22	Circular
Twenty five paise		Ferritic Stainless Steel (FSS)	2.83	19	Circular

- About 92 per cent resources are in Odisha.
- The remaining 8 per cent resources are distributed in Jharkhand, Nagaland and Karnataka.

## Nickel

- High resistance to heat, corrosion & oxidation.
- Stainless steel, Aerospace, Rocket industry

• Found in association with Chromite in Odisha, uranium deposits of Jaduguda.

• OD(93%)>JH>NL

• Indonesia(24%)>Australia(22%)>Brazil(12%)

• OD-major producer(92%)

• Indonesia (23%)>Phillippines (15%)>Russia

# Bauxite

80 % of bauxite [ore of aluminium] ore is used for making aluminium.

## Bauxite

- Aluminium metal extraction

• OD(51%)>AP(16%)> GJ(9%).

• **Mines:** OD-Panchpatmali, CG-surguja, MP-Shahdol.

• Guinea(25%)>Australia (20%)>Vietnam(12%)

• OD(65%), AP,GJ.

• Australia(29%)>China(19%)>Guinea (18%).

• India(7%)-5<sup>th</sup> in production

- **Odisha**
  - Largest bauxite producing state.
  - One-third of the total production of India.
  - Kalahandi and Koraput districts.
- **Chhattisgarh**
  - Second largest producer.
  - Maikala range in Bilaspur, Durg districts and the Amarkantak plateau regions of Surguja, Raigarh and Bilaspur are some of the areas having rich deposits of bauxite.



- **Maharashtra**
  - Third largest producer.
  - Largest deposits occur in Kolhapur district.
  - Kolhapur district contain rich deposits with alumina content 52 to 89 per cent.
  - Other districts: Thane, Ratnagiri, Satala and Pune.
- **Jharkhand**
  - Ranchi, Lohardaga, Palamu and Gumla districts.
  - High grade ore occurs in Lohardaga.
- **Gujarat**
  - Jamnagar, Junagadh, Kheda, Kachchh, Sabarkantha, Amreli and Bhavnagar.
  - The most important deposits occur in a belt lying between the Gulf of Kachchh and the Arabian sea through Bhavnagar, Junagadh and Amreli districts.

- Aluminum Industries in India
- UP → Hindalco (Birla)
- Odisha → Hirakund (Birla), Jharsuguda (Vedanta)
- Chhattisgarh → Korba (Vedanta)
- BALCO → Ratnagiri, Maharashtra
- NALCO → Koratpur, Odisha
- MALCO → Mettur, TN

## Lead and Zinc

- Malleable [can be hammered into thin sheets], soft, heavy and bad conductor.
- Lead nitrate is used in dyeing and printing.
- Lead does not occur free in nature. It occurs as a cubic sulphide known as GALENA.

- Zinc is a mixed ore containing lead & zinc.
- Zinc is found in veins in association with galena, chalcopyrites, iron pyrites and other sulphide ores.
- It is mainly used for alloying and for manufacturing galvanized sheets.
- It is also used for dry batteries, electrodes, textiles, die-casting, rubber industry and for making collapsible tubes containing drugs, pastes and the like.



### Lead & Zinc

- Both occur together in ore.
- Pb-acid storage batteries
- Zn- Galvanising

- Reserve:
- Pb-Zn Ore: RJ(90%), AP(3%), MP(2%)

• **Mines:** Rampura-Agucha of Bhilwara, Zawar of Udaipur, Others at Rajasamand, Ajmer.

- **Pb:** Australia(40%), China (20%), Russia & Peru (7%) each.
- **Zn:** Australia(27%)>China (18%), Russia & Mexico (9%).

• **RJ**-major producer(99%)

• **Pb:** China(48%)> Australia (9%)>Peru (6%). India(4%)-5<sup>th</sup> in production

• **Zn:** China(31%)> Peru(11%). India(5%)-4<sup>th</sup> in production

## Gold Reserves in India

Kolar Gold Field, Hutti Gold Field and Ramgiri Gold Field are the most important gold fields.

- **Karnataka**
- Karnataka is the largest producer of gold in India.
- Gold mines are located in Kolar [Kolar Gold Field], Dharwad, Hassan and Raichur [Hutti Gold Field] districts.
- Kolar Gold Fields is one of the deepest mines of the world. [Usually, gold mines are the deepest mines in the world. Mponeng Gold Mine in South Africa is the deepest mine in the world (3.9 km deep)]
- **Andhra Pradesh**
- Second largest producer of gold in India.
- Ramagiri in Anantapur district is the most important gold field in AP.





- **Jharkhand**
- Sands of the Subarnarekha (gold streak) river have some alluvial gold.
- Sona nadi in Singhbhum district is important.
- Sonapat valley is another major site with alluvial gold.
- **Kerala**
- The river terraces along the Punna Puzha and the Chabiyar Puzha have some alluvial gold.

<b>GOLD</b>	Metallic (Non-Ferrous)	Jamui District (Bihar) (Still exploring) Kolar Gold Field (Karnataka) Hutti Gold Field (Karnataka) Ramagiri Mines (Andhra Pradesh) Sunarnarekha Sands (Jharkhand)	1. Bihar 2. Rajasthan 3. Karnataka 4. West Bengal	1. China 2. USA 3. South Africa
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## Silver Distribution – India & World

### Silver

• Highest electrical conductivity amongst all metals.  
• Used in printed electric circuits, coating for e-conductors in alloys of gold & copper for electrical contacts, solar cells

- RJ(87%)>JH(5%)>AP(3%)
- Barak deposit in Rajasthan
- Peru(21%)>Poland (18%)>Australia(16%)>Russia (8%)>China & Mexico(7% each), Chile(5%).

• Mexico, Peru, China, Australia, Russia, Chile and Poland are the main producers of silver.

- The chief ore minerals of silver are argentite, stephanite, pyrargyrite and proustite.
- It is found mixed with several other metals such as copper, lead, gold, zinc, etc.
- India is not a major producer of silver in the world.
- Zawar mines in Udaipur district of Rajasthan is the major producer of silver [smelting of galena ore in Hindustan Zinc Smelter].
- The Tundoo Lead Smelter in Dhanbad district of Jharkhand is another major silver producer.
- Some silver is produced by Kolar Gold Fields and Hutti gold mines.
- **The Hindustan Copper Ltd. at Maubhandar smelter in Singhbhum district of Jharkhand obtains silver from copper slimes.**
- Silver is also produced by Vizag Zinc smelter in Andhra Pradesh from the lead concentrates.

## Tungsten

•Ordnance, Hard cutting tools, bulb filaments, paints, ceramics, textile

•KA(42%), RJ(27%), AP (17%) and MH(9%).

•**Mines:** **RJ**-Degana, sirohi, **WB**-Bankura, **MH**-Sakoli basin of Bhandara District and Nagpur

•China (59%)>Russia (7%)>Vietnam (3%)

•KA>RJ>AP

•China was the leading producer (78%) followed by Vietnam (7%) and Russia



# Parcham Classes